SPATIAL AND TEMPORAL VARIABILITY OF THE BOTTOM BOUNDARY LAYER IN A COASTAL UPWELLING SYSTEM (RIA DE VIGO NW IBERIAN PENINSULA)

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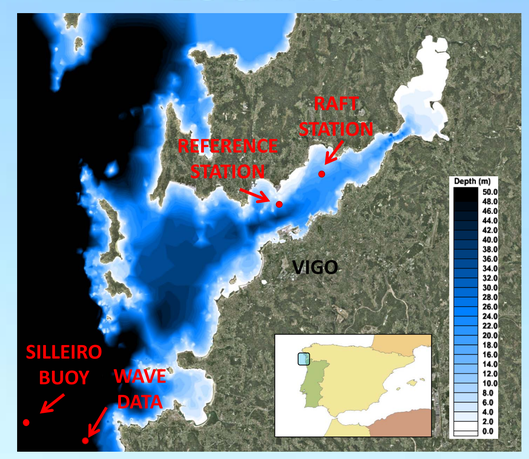
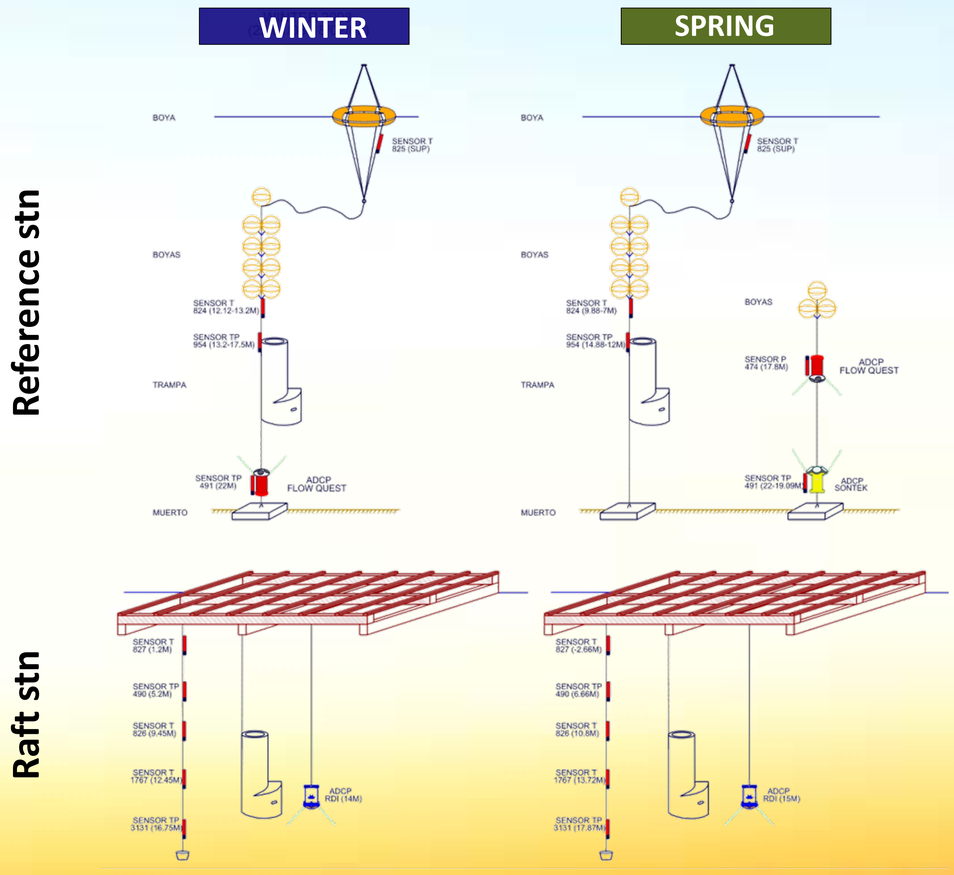
LOCATION



INTRODUCTION

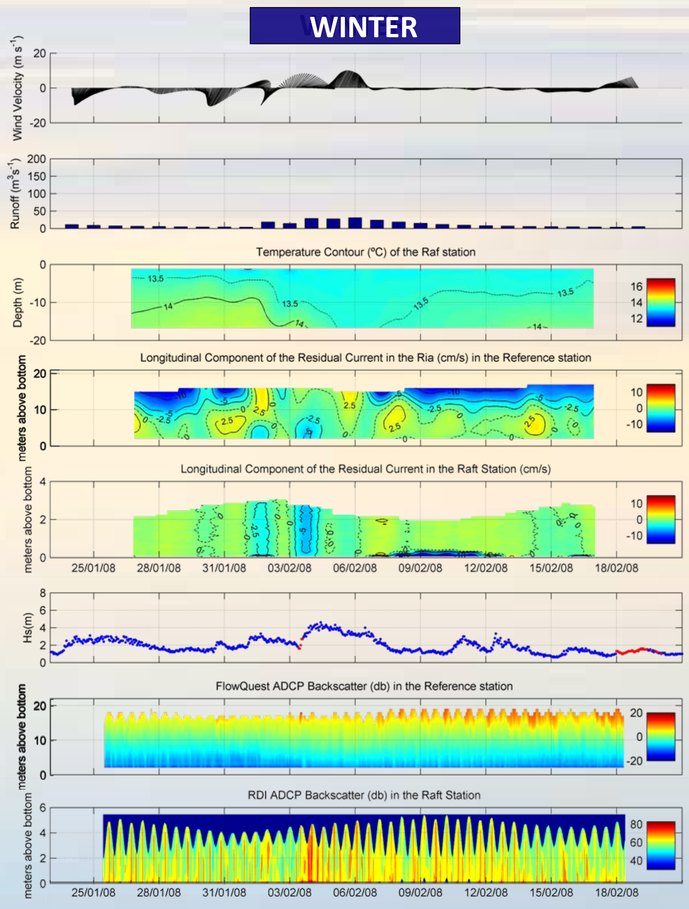
The bottom boundary layer at two different sites in the Ría de Vigo has been studied based on combination of 3 different Acoustic Doppler Current Profilers (RDI1200KHz, Sontek500KHz and FlowQuest1000) during four periods between autumn 2007 to summer 2008. One study site was located in the middle of a mussel raft area (Raft stn) and the other station was positioned in a more external location and not affected by mussel rafts (Reference stn).

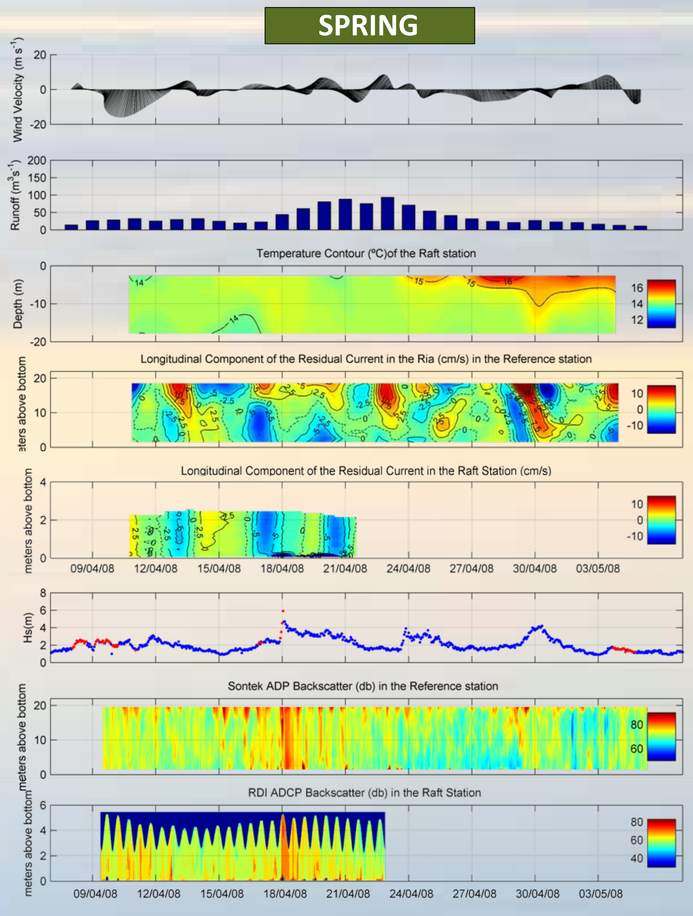
It has been selected the winter and spring period due to their contrasting differences. At the Raft stn, an RDI ADCP looking downwards was deployed. At the reference stn, another ADCP (Flowquest in winter and Sontek in spring) was deployed looking upwards. The water column thermal structure at the two sites was analyzed based on thermistor chains with 4 or 5 thermistors. Additionally, wind series in Silleiro buoy, propagated wave series near Cape Silleiro and runoff have been analised.



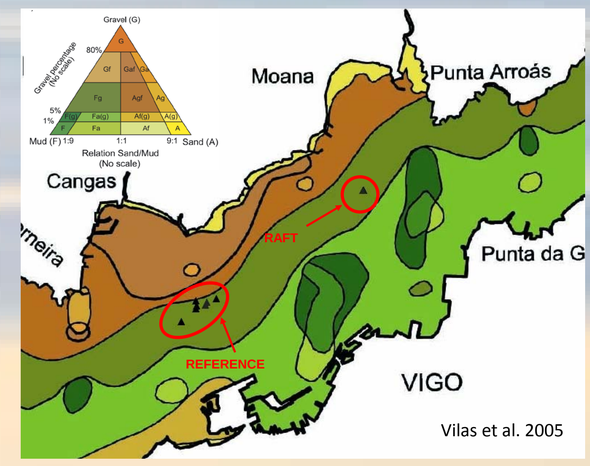
RESULTS

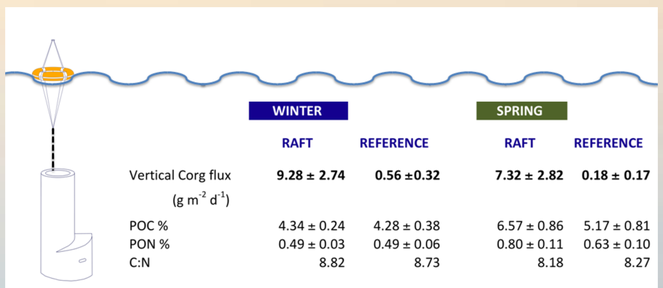
HYDRODYNAMIC REGIME





VERTICAL FLUXES AND SURFACE SEDIMENTS





		WINTER		SPRING	
		RAFT	REFERENCE	RAFT	REFERENCE
	Vertical Corg flux ($g\ m^{-2}\ d^{-1}$)	**9.28 ± 2.74**	**0.56 ±0.32**	**7.32 ± 2.82**	**0.18 ± 0.17**
	POC %	4.34 ± 0.24	4.28 ± 0.38	6.57 ± 0.86	5.17 ± 0.81
	PON %	0.49 ± 0.03	0.49 ± 0.06	0.80 ± 0.11	0.63 ± 0.10
	C:N	8.82	8.73	8.18	8.27
Sediment	POC %	4.04 ± 0.02	3.20 ± 0.05	4.22 ± 0.13	3.29 ± 0.10
	PON %	0.48 ± 0.01	0.36 ± 0.01	0.50 ± 0.02	0.36 ± 0.01
	C:N	8.46	8.93	8.50	9.22

The winter period was characterized by prevailing northerly winds and low river discharge. Water column temperature showed a thermal inversion, probably enhanced by river discharge during the middle of the study period. Currents respond to the typical upwelling circulation associated to shelf winds. The most significant backscatter signal was produced associated to the highest residual currents.

The spring period was characterized by fluctuating wind conditions and high river discharge, which lead to variable residual currents, shifting from downwelling to upwelling conditions. Water column temperature evolved from thermally homogenized to incipient stratification. An intense backscattering peak was observed on April 18th associated with swell of 3rd quadrant (red dot plotted).

In spite that mussel culture raft can modify the hydrodynamic regime, bottom currents had similar behavior at the two sites.

Organic carbon fluxes were much higher at the raft stn mainly due to mussel biodeposition. However, biogeochemical properties of this material do not change between sites for each study period. Surface sediment textural characteristics were very similar at the two sites, except for relatively higher %Corg levels at the raft site.

CONCLUSIONS

Our data show that in spite of much higher biogenic vertical fluxes at the raft position, surface sediment characteristics do not differ at the two sites. We suggest that the hydrodynamic regime may be playing an important role in dispersing mussel biodeposits and consequently avoiding the occurrence of hypoxia in the seabed.

ACKNOWLEDGEMENTS

This work has been supported by the research project RAFTING (CTM2007-61983/MAR), project BATEA (PGIDIT06TAM31202PR), project REIMAGE (CTM2011-30155-C03-03) and the Isabel Barreto Program (Xunta de Galicia). Thanks to Puertos del Estado for wind and wave data. Thanks to the Mytilus crew, and our research group for their support and cooperation in the project and specially to Gilcoto, M. for his comments and to Mar Nieto for her desing.